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# *Self-Monitoring Strategies Used by Developmental and Non-Developmental College Students*

*This study examined self-monitoring strategies used by both developmental and non-developmental college students. Students were asked to describe how they know when they have completed a reading assignment, have studied enough for a quiz, and have studied enough for an examination. It was anticipated that at the beginning of the semester, the non-developmental students would list both more strategies and more reliable/sophisticated strategies than the developmental students. It was also anticipated that at the end of the semester, the developmental students who were enrolled in a college study strategies course would report using both more strategies and more reliable/sophisticated strategies than they did at the beginning of the semester. Each hypothesis was supported, $p < .001$.*

To be successful in college, developmental students need to use self-monitoring strategies. Although many students use some type of self-monitoring strategies, many of those strategies tend to be ineffective. Without more effective self-monitoring strategies, students are unable to manage their time, one of the most important criteria for college success. Similarly, they are often unaware of how effectively and efficiently they use their time. They put in many hours on their assignments but accomplish very little because of con-

centration problems and passive study strategies; moreover they are unaware of why they accomplish so little. Many students spend hours reading text material but understand or remember very little of what they read. They are often unable to tell when they are having comprehension problems because they have not learned how to monitor their reading comprehension. Students also have problems setting goals and monitoring their academic progress. Many developmental students spend all of their study time reading over the material and are quite surprised when their test grades do not match their expectations. They have not developed the skills to monitor their learning or to monitor the effectiveness of the strategies they use to prepare for examinations. Finally, many students do not know how to monitor their test-taking skills. They cannot accurately gauge their success on examinations and often leave a testing site uncertain about the outcome.

Self-monitoring is one aspect of a broader concept, self-regulation (Schunk & Zimmerman, 1994, 1998). Younger students often rely on teachers and other adults to tell them exactly what to do and when to do it. However, as children grow and become more sophisticated in their learning, they become more self-regulated. By the time they reach college, they need to use self-regulation strategies if they expect to experience success. In fact, one of the most difficult aspects of their transition to college is learning how to become self-regulated learners.

A healthy developmental sequence would involve students becoming steadily more self-regulated as they moved through elementary school, middle school, and high school. Unfortunately, many students, for a variety of reasons, continue to be regulated primarily by the adults in their lives and learn very few self-regulation skills when it comes to academic endeavors. Many of the self-regulation strategies involve metacognition—the ability to think about and control one's learning (Baker & Brown, 1984). According to Wade and Reynolds (1989), metacognition involves three types of awareness on the part of the learner. First, students must have task awareness, which involves learning to identify what they have to learn or do in order to complete a task. Students also must master strategy awareness. They must learn to select the specific strategy or strategies that will be the most effective for completing different types of tasks. Finally, students must master performance awareness. They must learn to determine whether they have mastered the material that they previously identified as important, and how well it has been learned. To succeed in college, students must successfully learn to regulate their motivational, goal-setting, time-management, reading, note-taking, test-preparation, and test-taking strategies in addition to many others. Part of learning how to be a self-regulated learner

is learning how to monitor one's progress when completing a variety of study tasks.

A number of researchers have examined self-regulation and self-monitoring in a variety of areas. For example, Morgan (1985) found that college students who focused on sub-goals displayed increased intrinsic motivation and better performance. Thiede (1999) examined self-monitoring during a multi-trial learning task and found that when college students had several trials to learn paired associations, the opportunity to make a judgment about their level of learning following each trial improved their accuracy. However, perhaps most interesting is the work of Lan and his associates (Lan, 1996; Lan, 1998; Lan, Bradley, & Parr, 1993; Lan, Repman, & Seung-Youn, 1998) who examined self-monitoring in college students taking statistics and other courses. Lan, Denham, and Lin (1998) developed a rubric to differentiate among unreliable/unsophisticated strategies and more reliable/sophisticated self-monitoring strategies. With this rubric, they examined the strategies used by students from elementary school through graduate school and found that younger students generally used less effective self-monitoring strategies, whereas older students used more sophisticated (more effective) strategies with greater frequency.

Some theorists (e.g., Winne, 1995) have argued that self-regulation is a part of all goal-directed activities. Others (e.g., Pressley, 1995) have argued that we do not typically see self-regulation until students develop expertise in a particular domain. Barnett (2000) examined students' use of self-regulation in several psychology courses. He found that less experienced college students did not adjust their study strategies for quizzes even when they experienced poor performance. However, experienced students were more likely to adjust their study strategies when they experienced poor performance early in the semester.

In summary, developmental students and other students who experience academic difficulties appear to rely heavily on unreliable and ineffective self-monitoring strategies (Nist & Holschuh, 2000). On the other hand, more successful students typically rely much more heavily on sophisticated and effective strategies. Further, because most college study-strategies classes emphasize instruction and practice of effective strategies, we anticipated that students in such classes would display a change in the types of self-monitoring strategies that they report using from early in the semester to late in the same semester. We also anticipated that early in the semester, students enrolled in a college study-strategies class would use more naive self-monitoring strategies than students enrolled in a class that required successful completion of a prerequisite course. However, we expected that the students enrolled

in the college study-strategies class would, by the end of the semester, report the use of more strategies and more sophisticated strategies.

## Method

### *Participants*

Students, enrolled in a four-year public institution with an enrollment of approximately 3,000 students in a small town, were recruited from three sections of College Study Strategies (CSS) and one section of Adolescent Development during the Spring 2001 semester. College Study Strategies is a three-credit elective available to first- and second-year students. The students in the CSS classes were primarily freshmen who generally enrolled because they were not satisfied with their academic performance during their first semester. Several students were first-semester freshmen who had been admitted provisionally and others were sophomores who had experienced poor performance as freshmen. Therefore, we referred to them as developmental students. The students in Adolescent Development were primarily sophomores and juniors, along with a few freshmen and seniors. All students enrolled in this class were required to have received at least a "C" in Introduction to Psychology. These students we referred to as non-developmental students.

Sixty-three students were enrolled in the CSS classes at the beginning of the semester and completed the first questionnaire. However, eight of those students dropped the class during the semester (most within the first week due to schedule changes) and only 55 completed the study. Forty-five students were enrolled in the Adolescent Development class and 44 completed the study.

### *Instrument*

We developed the Self-Monitoring Strategies questionnaire, a one-page, open-ended instrument that asks students to respond to three questions. In the instructions, students are asked to describe the strategies or methods that they use to determine when to stop working on a task. The three questions are as follows:

1. How do you know when you've completed your reading assignments?
2. How do you know when you've finished studying for a quiz?
3. How do you know when you've finished studying for an exam?

### *Procedures*

The Self-Monitoring Strategies questionnaire was administered in the

CSS classes on the first day of the semester and to the Adolescent Development class during the first week. The questionnaire was again administered during the last week of the semester. During both administrations students were asked to write only their student identification numbers on the forms and were given approximately ten minutes to complete the questionnaire, although more time was given when needed. Prior to scoring the protocols, a separate identification number was substituted on each questionnaire to maintain student anonymity. Three judges, using the rubric developed by Lan, Denham, and Lin (1998), scored the students' responses to the questionnaires. Each response was placed into one of 13 categories from "Doing Nothing" and attending to "Physiological Signs" to "Systematic Rehearsal" and "Reviewing Previous Performance" (see Appendix). Each judge individually scored the responses, and then the three judges compared responses. When there were disagreements among judges, discussion ensued until a consensus could be reached. The judges scored a total of 918 responses.

Because this study used a quasi-experimental design with two separate populations, we decided that the use of parametric statistics would be inappropriate. Also, since the primary analysis involved comparisons of proportions of students reporting the use of various strategies, $\chi^2$ analysis is the most appropriate method for evaluating the data.

## Results

The questionnaire data are summarized in Tables 1 and 2. Table 1 represents the percentage of students in the CSS classes who listed each type of strategy at the beginning and end of the semester (because many students listed more than one strategy, these will sum to over 100%). The first seven categories are characterized as unsophisticated/unreliable in that they give the users little useful information about their actual level of preparation. The last six are characterized as sophisticated/reliable because they give the users better, more useful information about their level of preparation. Examples of the changes that occurred in the developmental students can be seen in Table 1. By the end of the semester, when completing reading assignments, developmental students showed a dramatic reduction in the use of the unreliable/unsophisticated strategy, "doing as required," and a dramatic increase in the use of the reliable/sophisticated strategy, "systematic rehearsal." When preparing for quizzes and exams, the developmental students also displayed dramatic increases in their use of "self-testing," "overt representation," and "systematic rehearsal" strategies over the semester. The developmental students also reported a dramatic decrease in the use of the unreliable/unsophisticated strategies, "doing as required," and "sense

*Table 1*
*Percentage of Student Reponses for Categories of Self-Monitoring —, College Study Strategies Class. Reliable/Sophisticated responses are designated by a + sign.*

| Category | Completing Reading Assignments | | Studying for a Quiz | | Studying for an Exam | |
|---|---|---|---|---|---|---|
| | Semester Start | Semester End | Semester Start | Semester End | Semester Start | Semester End |
| Doing Nothing | 0 | 0 | 2% | 0 | 2% | 0 |
| Physiological Sign | 0 | 2% | 5% | 4% | 7% | 5% |
| Time or Repetition | 7% | 2% | 13% | 7% | 16% | 9% |
| Confidence Feeling | 2% | 0 | 20% | 16% | 18% | 16% |
| Told by Others | 0 | 0 | 0 | 0 | 0 | 0 |
| Doing as Required | 65% | 24% | 20% | 5% | 20% | 4% |
| Sense of Knowing or Understanding | 44% | 55% | 36% | 27% | 42% | 20% |
| + Self-testing | 0 | 9% | 20% | 65% | 18% | 44% |
| + Testing by Others | 0 | 0 | 2% | 0 | 4% | 0 |
| + Overt Representation | 2% | 2% | 2% | 11% | 7% | 25% |
| + Elaboration | 0 | 2% | 0 | 0 | 0 | 0 |
| + Systematic Rehearsal | 4% | 31% | 11% | 33% | 15% | 35% |
| + Review Previous Performance | 0 | 0 | 0 | 0 | 0 | 2% |

of knowing and understanding." Table 2 represents the percentage of students in the Adolescent Development class who listed each type of strategy. It is clear from Table 2 that the students in Adolescent Development displayed little change in their reported strategy use over the course of the semester. These data are summarized in Figure 1, which lists the percentage of responses that were rated as either unreliable/unsophisticated or reliable/sophisticated.

An analysis of the data in Figure 1 indicates that developmental students displayed a consistent pattern of movement from articulating primarily unreliable/unsophisticated strategies at the beginning of the semester to articulating primarily reliable/sophisticated strategies at the end of the semester. For example, at the beginning of the semester only 4% of the strategies that they reported using for reading assignments were rated as reliable/sophisticated, whereas, at the end of the semester that figure was 44%. When preparing for quizzes, at the beginning of the semester only 26% of the strategies they reported were rated as reliable/sophisticated, but that number had increased to 65% at the end of the

*Table 2*
*Percentage of Student Reponses for Categories of Self-Monitoring — Adolescent Development Class. Reliable/Sophisticated responses are designated by a + sign.*

| Category | Completing Reading Assignments | | Studying for a Quiz | | Studying for an Exam | |
|---|---|---|---|---|---|---|
| | Semester Start | Semester End | Semester Start | Semester End | Semester Start | Semester End |
| Doing Nothing | 2% | 2% | 0 | 0 | 0 | 0 |
| Physiological Sign | 2% | 2% | 2% | 0 | 4% | 2% |
| Time or Repetition | 15% | 13% | 13% | 16% | 20% | 22% |
| Confidence Feeling | 2% | 0 | 13% | 7% | 13% | 7% |
| Told by Others | 0 | 0 | 0 | 0 | 0 | 0 |
| Doing as Required | 40% | 27% | 13% | 18% | 11% | 13% |
| Sense of Knowing or Understanding | 33% | 49% | 42% | 42% | 44% | 33% |
| + Self-testing | 5% | 5% | 20% | 18% | 16% | 18% |
| + Testing by Others | 0 | 0 | 4% | 0 | 7% | 5% |
| + Overt Representation | 2% | 5% | 9% | 4% | 9% | 9% |
| + Elaboration | 7% | 5% | 4% | 0 | 11% | 5% |
| + Systematic Rehearsal | 15% | 15% | 4% | 4% | 11% | 16% |
| + Review Previous Performance | 0 | 0 | 0 | 0 | 4% | 4% |

semester. Finally, at the beginning of the semester only 30% of the strategies reported for preparing for exams by the developmental students were rated as reliable/sophisticated, whereas by the end of the semester we characterized 66% of their strategies as reliable/sophisticated. These changes were all statistically significant: reading assignments,, $x^2(1) = 21.04$, $p < .001$; quizzes, $x^2(1) = 30.68$, $p < .001$; exams, $x^2(1) = 25.96$, $p < .001$. On the other hand, the non-developmental students displayed no change in their strategy use for reading assignments, $x^2(1) = .09$, $p > .10$; and actually displayed a movement toward unsophisticated/unreliable strategies for quizzes, $x^2(1) = 20.08$, $p < .001$. However, in the area of exam preparation they did show a movement from unsophisticated to sophisticated strategies, similar to that shown for the developmental students, $x^2(1) = 13.49$, $p < .001$.

Developmental students listed more strategies at the end of the semester than they did at the beginning of the semester, whereas, the non-developmental students displayed very little change in the number of strategies that they listed. Table 3 displays the mean number of strategies each student listed at both the beginning and the end of the semester.

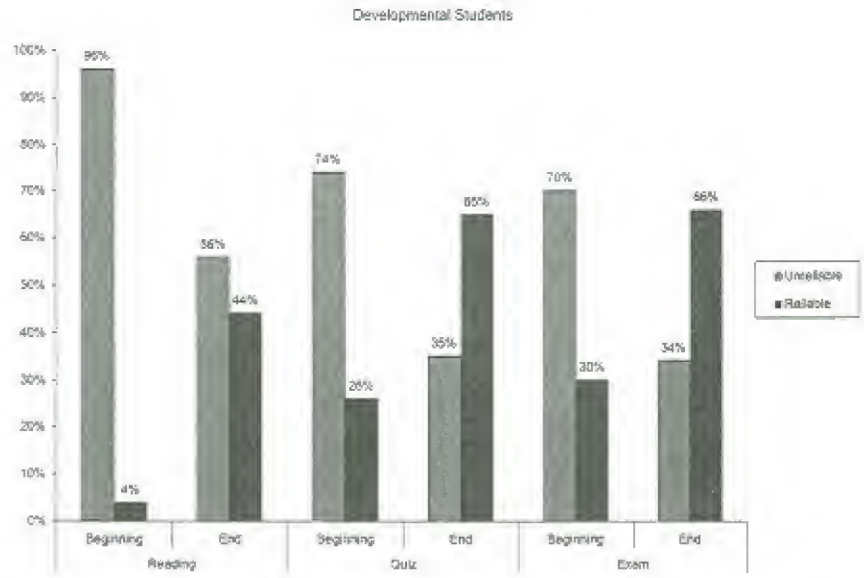


*Figure 1.* Percentage of total responses categorized as either unreliable or reliable for developmental and non-developmental students at both the beginning and the end of the semester.

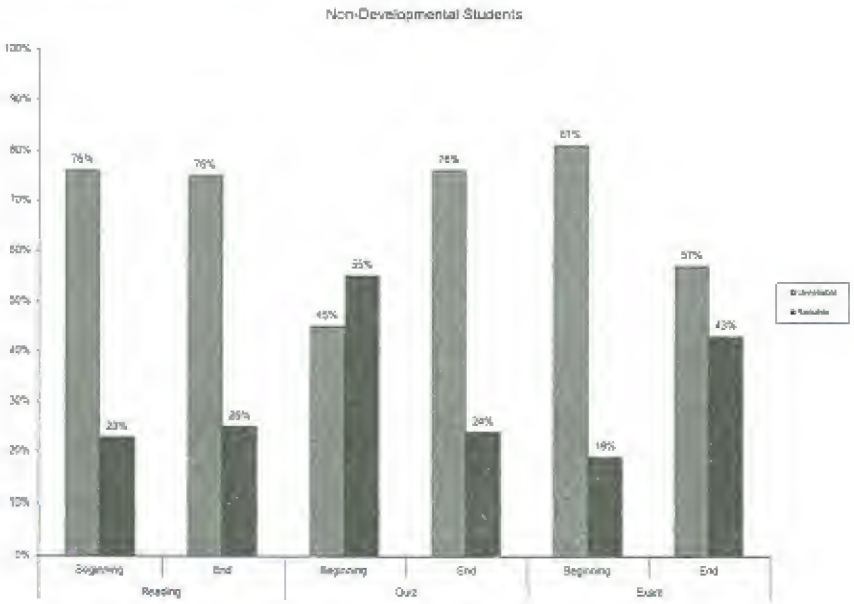

*Table 3*
*Mean Number of Strategies Used Per Student*

| | Completing Reading Assignments | | Studying for Quizzes | | Studying for Exams | |
|---|---|---|---|---|---|---|
| | Semester Start | Semester End | Semester Start | Semester End | Semester Start | Semester End |
| Developmental Students | 1.24 | 1.45 | 1.31 | 1.69[1] | 1.51 | 1.89[1] |
| Non-Developmental Students | 1.52 | 1.55 | 1.52 | 1.63 | 1.81 | 1.68 |

[1] Coding as category number 12 (Systematic Rehearsal) actually decreased the number of responses per student because two to five or more responses were counted as one. For example, if a student indicated that he or she highlighted the textbook, took notes, made word cards, made study sheets, and used the Five-Day Study Plan, the coding was only number 12 (one strategy in place of five).

## Discussion

These data clearly support our hypothesis that developmental students who completed a College Studies Strategies course could articulate and report using more reliable and sophisticated self-monitoring strategies for reading assignments, quizzes, and exams than they could at the beginning of the semester. They also reported using more strategies at the end of the semester than they did at the beginning. The data also show that at the beginning of the semester, non-developmental students articulated and reported using more strategies and more sophisticated strategies than developmental students. The non-developmental students displayed growth in their reported use of more sophisticated strategies only when preparing for exams.

This research has three potential limitations. First, this is a quasi-experimental design that uses two different populations in two different conditions. It is difficult to tell if the results are due to the different interventions, differences between the developmental and non-developmental students, or a combination of both. A true experimental design would involve students from each population being randomly assigned to each of the courses.

Second, it is a pretest-posttest design. With this type of design the students complete the same questionnaire at the beginning and at the

end of the semester. It is possible that students who never gave much thought to self-monitoring would start thinking more about it simply as a result of having completed the first questionnaire. Therefore, if we see changes the second time the questionnaire is administered, we cannot be certain if changes are attributable to the intervention (in this case the CSS course) or to having taken the questionnaire previously. However, because both groups took the questionnaire twice and because the developmental group changed whereas the non-developmental group did not, we have support for attributing observed changes to the intervention.

The third potential limitation is a result of the questionnaire being a self-report instrument. The developmental students learned many self-monitoring strategies during the semester. Therefore, at the end of the semester they may have been aware of what the researchers were hoping to see. Although it is possible that they simply reported what they thought the researchers wanted, the students had to generate on this questionnaire a list of the strategies they used for various tasks in response to open-ended questions. These responses indicated their knowledge of both task awareness and strategy awareness. Clearly, follow-up studies of students' actual self-monitoring strategy use would be helpful.

In summary, it does appear, based on self-report, that a College Study Strategies course can help students develop more reliable and sophisticated self-monitoring strategies. Even when students get feedback indicating that their preparation for a task was inadequate (often in the form of grades), many tend to continue using the same ineffective study and self-monitoring strategies. For many students this is a result of their lack of knowledge of other more effective study and self-monitoring strategies. A College Study Strategies course can be effective when students are not only taught new strategies, but are also given opportunities to use many of the strategies with college-level material and are encouraged to incorporate those strategies when completing their own course work. We predict that as they see that the strategies can be effective, they will be more likely to use them, and as a result achieve greater academic success.

We believe that this study provides support for Zimmerman and Paulsen's (1995) contention that students can be taught to use self-monitoring strategies in a college success or study-strategies course. In our College Study Strategies course, we taught self-monitoring strategies in areas such as time management, goal setting, concentration, text reading, note taking, test preparation, and test taking. Students had opportunities to practice using them so that they could see that the strategies were effective. As students learned new study strategies, they also learned how

to monitor the effectiveness of those strategies. They were encouraged to modify the strategies to meet their own needs and even to develop their own strategies. Finally, students were encouraged to share with other students the effectiveness of the various strategies that they used and the self-monitoring strategies that they had developed. From the data reported here, we believe it is crucial that these self-monitoring strategies be integrated into college success courses.

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## Appendix

*Categories of Students' Responses to the Self-Monitoring Questionnaire*

| Category | Definition | Sample Responses |
|---|---|---|
| Doing Nothing<br>1 | Inactive cognitively or behaviorally | "I just know I'm ready."<br>"Just do it, I could answer them."<br>"I have faith that God will see me through them."<br>"I don't. There is so much to remember." |
| Physiological Sign<br>2 | Bodily responses | "When you are tired you study enough."<br>"My eyes are tightened and they hurt."<br>"I usually just study until I fall asleep."<br>"I study till my eyeballs are about to pop out." |
| Time or Repetition<br>3 | Set allowance for studying time and repetition | "Because I have studied for 1 hour."<br>"I know I'm ready because I have studied real long."<br>"When mid-night comes, study non-stop for final exams."<br>"Go over a couple of times."<br>"After I study the exams about 3 times."<br>*"I usually study up until the quiz."** |
| Confidence Feeling<br>4 | Feel confident and prepared | "I love the feeling of knowing the answer to the question; then I feel that I have prepared."<br>"When I feel good about myself."<br>"If you feel comfortable and not guilty about stopping, then you are somewhat ready." |
| Told by others<br>5 | Rely on other's judgment | "I practice until my mom says you have studied enough."<br>"Because my parents say I'm ready."<br>"I ask for my teacher's opinion." |
| Doing as Required<br>6 | Complete assigned tasks | "Basically, when I read over my notes and chapters, I stop."<br>"I know I am ready when I have completed my assignment or assigned reading."<br>"When I have done all my homework."<br>*"When I read and highlight."**<br>*"When I get to the end of the chapter."**<br>*"When I finish reviewing my notes."** |

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|---|---|---|
| Sense of Knowing or Understanding 7 | Emphasize understanding/ memorization without really monitoring it | "When I got it memorized, I am ready."<br>"When I remember everything."<br>"I feel confident that I have an adequate understanding."<br>"I have a good understanding of the material."<br>*"When I knew everything."**<br>*"When I can recall the information without help."**<br>*"When I read the assignment and understand what I just read."**<br>*"When I can answer questions relating to what I have used."** |
| Self-testing 8 | Explicitly test one's own knowledge | "When I give myself my own quiz and if I pass it, I know I am ready."<br>"When I can ask myself questions and answer them in less than a minute without looking for the answer."<br>"You create questions that you think could be asked on the quiz and try to answer them."<br>*"When I have self-tested."**<br>*"When I give myself a self-test and I know the material."**<br>*"I know I am done studying for a quiz or test when I have gone through all of my predicted questions for the chapter and was able to answer all of them."**<br>*"After being able to answer all of the predicted questions"**<br>*"When I can go over the review sheet and answer all the questions."**<br>*"When I am able to answer the end-of-chapter questions."** |
| Testing by Others 9 | Explicitly be tested by others | "When my mom can test me and I get every single one exactly correct."<br>"I just give my friend the class notes and text and let them drill me on anything."<br>"I have my wife ask me questions from materials and when I get enough answers correct, I quit." |

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|---|---|---|
| Overt Representation** 10 | Explicitly present or explain what is learned to other *or to myself** | "When I know the information well enough to talk about it with my roommate or explain it to another person."<br>"I feel I have studied enough when I can explain a concept to someone else."<br>"I teach my husband the material for the test."<br>"I know I am ready when I discuss the information with others and know what I am talking about."<br>*"I know I have completed my reading assignments when I can talk about what I just read."**<br>*"I study what I don't know until I can explain all of the material."**<br>*"When I am able to recite it easily or write it down."**<br>*"When I can go back and look at the main headings and sub-headings and am able to recite and put the information listed underneath in my own words."** |
| Elaboration 11 | Add information to material to be learned to make the material precise, meaningful, and complete | "I can not only rewrite the basic outline of the text and notes but I can say to myself examples of each point and know how it is used."<br>"Until I can apply the knowledge to different situations."<br>"I try to relate the information to events in my life to make it easier to remember."<br>"If I can look at the outline and fill in the information with examples."<br>"know about the connection between concepts, can distinguish different concepts and give some different examples."<br>*"Make marginal notes and predict questions in the margin."** |

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|---|---|---|
| Systematic Rehearsal 12 | Summarize and rehearse with main ideas and key concepts | "Notecards are always a part of my personal review." "When I can quote every single flashcard perfectly and explain concepts." "When I can recreate some major points of the chapter." "I write and rewrite all notes and outlines." "I will use my notes and the text to make myself a study guide –rewriting the important material helps me." *"When I have made study sheets."** *"When I have predicted questions in the margin."** *"I know the material after I previewed, read, highlighted, and wrote questions and take notes on what I've read."** *"When I've finished reading and highlighting the entire assignment and made note cards"** *"After completing the Five-Day Study Plan. Recite note cards and recite question cards".** *"I read and highlight, go over lecture notes, make flash cards, and practice till I know them all."** *"After I had prepared and studied all the chapters: remarking, study sheets, word cards, reciting."** *"After highlighting, combining lecture notes with text notes, predicting questions, making note cards or charts and thoroughly testing myself."** |
| Review Previous Performance 13 | Judge from performance on previous exams or assignment | "When I know the main points which were covered in the past and can predict what the test is going to cover." "When I review all of the old tests and I know everything that I need to know." |

*Note.* Categories, definition, and responses, except for those in italics, are from Lan, Denham, and Lin, (1998). Permission to publish this adaptation was granted by William Lan.

*Italicized examples were added by authors.

**Overt representation was defined to include reciting or explaining to oneself.